IOP Conference Series: Materials Science and Engineering 2016 vol.158 N1

The evolution of the bone in the half-plane under the influence of external pressure

Gerasimov O., Shigapova F., Konoplev Y., Sachenkov O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd.The paper deals with the problem of restructuring the trabecular bone tissue in the half-plane under the influence of a distributed load. We used evolutionary relations in Cowin's formulation, describing changes in pore orientation in terms of the fabric tensor and the fraction of the solid bone volume in the region under consideration. We modeled the process of the half-plane loading by the distributed pressure. The lazy zone theory and physical relations were used to obtain the initial value of the change in the solid bone volume fraction. As a result, we found the pore distribution field and represented it for clarity as a field of the first eigenvectors of the fabric tensor, which corresponds to the direction of an ellipse's larger radius. This study reveals variation of pore geometry in time and with the distance from the load action line as well as describes the behavior of the solid bone volume fraction with the distance from the pressure line.

http://dx.doi.org/10.1088/1757-899X/158/1/012037